We claim:

1.   A pharmaceutical composition comprising:

        a polypeptide comprising at least one discoidin/C domain in an amount effective to modulate mammalian gamete adhesion.

2.   The composition of claim 1, wherein the polypeptide further comprises at least one EGF domain.

3.   The composition of claims 1 or 2, further comprising a pharmaceutically acceptable carrier or excipient.

4.   The composition of claims 1-3, wherein the polypeptide competitively inhibits in vivo or in vitro binding of sperm to unfertilized zona pellucida.

5.   The composition of claim 1, wherein the polypeptide promotes in vivo or in vitro binding of sperm to unfertilized zona pellucida.

6.   The composition of claims 1-5, wherein the polypeptide comprises SED1 polypeptide or a fragment thereof.

7.   The composition of claims 1-5, wherein the polypeptide comprises SEQ ID NOs. 2-7 or a fragment thereof.

8.   The composition of claims 1-7, wherein the compound binds to male gametes, female gametes, male and female gametes, zona pellucida, or combinations thereof.

9.   A recombinant polypeptide comprising SEQ ID Nos. 2-7 or a fragment thereof, wherein the recombinant polypeptide modulates mammalian gamete adhesion.

10. ·   A non-human animal model comprising a homozygous null mutation in an endogenous nucleic acid sequence encoding SED1 (SEQ ID NO. 2), a homolog or a fragment thereof.

11.   A gamete isolated from the non-human animal model of claim 10.

12.   The gamete of claim 11, wherein the gamete is a male gamete.

13.   The gamete of claim 11, wherein the gamete is a female gamete.

14.   An isolated antibody that selectively binds to at least one epitope of SED1 (SEQ ID NO. 2).

15.   The antibody of claim 14, wherein the antibody inhibits mammalian gamete adhesion.

16.   The antibody of claims 14-15, wherein the antibody is polyclonal, monoclonal, single chained, chimeric, humanized, or a fragment thereof.

17.   A method for modulating gamete adhesion comprising:

        combining mammalian sperm and a mammalian unfertilized oocyte in the presence of an amount of a polypeptide effective to modulate gamete adhesion, wherein the polypeptide comprises at least on discoidin/C domain.

18.   The method of claim 17, wherein the polypeptide further comprises at least one EGF domain.

19.   The method of claims 17 or 18, wherein the polypeptide competitively inhibits in vivo or in vitro binding of sperm to unfertilized zona pellucida.

20.   The method of claims 17 or 18, wherein the polypeptide promotes in vivo or in vitro binding of sperm to unfertilized zona pellucida.

21.   The method of claims 17-19, wherein the polypeptide comprises SED1 polypeptide or a fragment thereof.

22.   The method of claims 17-18, wherein the polypeptide comprises SEQ ID NOs. 2-7 or a fragment thereof.

23.   A method for diagnosing infertility comprising:

        (a)   detecting SED1 polypeptide, or a homolog thereof, on a mammalian male gamete;

        (b)   comparing the level of detected SED1 on the mammalian male gamete with a predetermined level of SED1 indicative of a fertile mammalian male gamete, wherein a level of detected SED1 on the male gamete lower than the predetermined level of SED1 is indicative of infertility.

24.   The method of claim 23, wherein an antibody is used to detect the SED1 polypeptide or homolog thereof.

25.   The method of claim 24, wherein the antibody is attached to a solid support.

26.   The method of claim 25, wherein the solid support is selected from the group consisting of a dip stick, array surface, polymer, metal, pin, comb, and a multiwell plate.

27.   A method for identifying modulators of gamete adhesion comprising:

(a)   assaying binding of SED1 polypeptide, a homolog, or fragment thereof to zona pellucida of unfertilized oocyte or a fragment thereof in the presence of a test compound; and

5   (b)   selecting the test compound that promotes or interferes with SED1 binding to zona pellucida of unfertilized oocyte and promotes or interferes with gamete adhesion compared to a control compound.

28.   A method for identifying modulators of gamete adhesion comprising:

(a)   assaying binding of SED1 polypeptide, a homolog, or fragment

10   thereof to ZP2, ZP3, or both ZP2 and ZP3 or a fragment thereof in the presence of a test compound; and

(b)   selecting the test compound that promotes or interferes with SED1 binding to ZP2, ZP3, or both ZP2 and ZP3 and promotes or interferes with gamete adhesion compared to a control compound.

15   29.   A contraceptive method comprising:

contacting a mammalian gamete with a compound that competitively interferes with SED1-mediated gamete adhesion.

30.   The method of claim 29, wherein the compound comprises an antibody or fragment thereof.

20   31.   The method of claim 31, wherein the compound comprises a polypeptide comprising at least one discoidin/C domain.

32.   The method of claim 31, wherein the polypeptide further comprises at least one EGF domain.

33.   The method of claim 29, wherein the compound comprises a SED1

25   polypeptide or a fragment thereof.

34.   The method of claim 33, wherein the SED1 polypeptide comprises a sequence selected from the group consisting of SEQ ID Nos. 2-7 or a fragment thereof.

35.   A method for increasing gamete adhesion comprising:

(a)   contacting a first mammalian gamete with a polypeptide comprising SEQ ID No 2 or 3 or a fragment thereof in an amount sufficient to promote adhesion between the first mammalian gamete and a second mammalian

5   gamete, wherein the first and second mammalian gametes are from different sexes;

(b)   combining the first mammalian gamete from step (a) with the second gamete under conditions sufficient to permit gamete adhesion.

36.   The method of claim 35, wherein the first mammalian gamete is male.

10   37.   The method of claim 35, wherein the first mammalian gamete is female.

38. .   A method for identifying modulators of gamete adhesion comprising:

(a)   contacting a male gamete with a test compound under physiological conditions, wherein the male gamete has or is obtained from a host having a null mutation in a nucleic acid encoding SEQ ID NO. 2, a homolog, or

15   fragment thereof;

(b)   assaying binding of the first male gamete from (a) with zona pellucida from unfertilized oocyte or a fragment thereof; and

(c)   selecting the test compound that promotes adhesion of the male gamete with the zona pellucida from unfertilized oocyte or a fragment thereof.

20   39.   A method of modulating fertility comprising:

administering to a mammal an amount of a gamete adhesion modulator sufficient to modulate SED1-mediated gamete adhesion.

40.   A composition comprising an amount of a gamete adhesion modulator sufficient to modulate SED1-mediated gamete adhesion when administered to a

25   host.

41.   A method for diagnosing infertility comprising:

assaying a sample from a male host for a nucleic acid sequence variation in a gene or transcript encoding or believed to encode SED1 or a homolog thereof compared to a nucleic acid sequence known to encode a functional

30   SED1 polypeptide, wherein the presence of a nucleic acid sequence variation in the gene or transcript is an indicator of infertility.

42.   The method of claim 41, wherein the nucleic acid sequence variation is selected from the group consisting of a deletion, insertion, inversion, transposition, single nucleotide polymorphism, and a substitution.